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3641

01/22/99

Below is a communication from the EXAMINER in charge of this application

COMMISSIONER OF PATENTS AND TRADEMARKS

ADVISORY ACTION

☒ THE PERIOD FOR RESPONSE:

a) ☒ is extended to run 5 months or continues to run _____ from the date of the final rejection

b) ☐ expires three months from the date of the final rejection or as of the mailing date of this Advisory Action, whichever is later. In no event however, will the statutory period for the response expire later than six months from the date of the final rejection.

Any extension of time must be obtained by filing a petition under 37 CFR 1.136(a), the proposed response and the appropriate fee. The date on which the response, the petition , and the fee have been filed is the date of the response and also the date for the purposes of determining the period of extension and the corresponding amount of the fee. Any extension fee pursuant to 37 CFR 1.17 will be calculated from the date of the originally set shortened statutory period for response or as set forth in b) above.

☒ Appellant's Brief is due in accordance with 37 CFR 1.192(a).

☒ Applicant's response to the final rejection, filed 1/11/99 has been considered with the following effect, but it is not deemed to place the application in condition for allowance:

1. ☒ The proposed amendments to the claim and /or specification will not be entered and the final rejection stands because:

a. ☒ There is no convincing showing under 37 CFR 1.116(b) why the proposed amendment is necessary and was not earlier presented.

b. ☒ They raise new issues that would require further consideration and/or search. (See Note).

c. ☒ They raise the issue of new matter. (See Note).

d. ☒ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal.

e. ☐ They present additional claims without cancelling a corresponding number of finally rejected claims.

NOTE: The new issues are the amendments to the claims particularly claims 24, 52-54, 56, 57. The issue of new matter is the amendments to claims 24, 52-54, 56, 57.

2. ☐ Newly proposed or amended claims _____ would be allowed if submitted in a separately filed amendment cancelling the non-allowable claims.

3. ☒ Upon the filing an appeal, the proposed amendment ☐ will be entered ☒ will not be entered and the status of the claims will be as follows:

Claims allowed: NONE
Claims objected to: NONE
Claims rejected: 24-29, 38-57

~~However~~;

☐ Applicant's response has overcome the following rejection(s): _____

4. ☐ The affidavit, exhibit or request for reconsideration has been considered but does not overcome the rejection because _____

5. ☐ The affidavit or exhibit will not be considered because applicant has not shown good and sufficent reasons why it was not earlier presented.

☐ The proposed drawing correction ☐ has ☐ has not been approved by the examiner.

☐ Other

HARVEY E. BEHREND
PRIMARY EXAMINER
GROUP 2200

PTOL-303 (REV. 5-89)

8/25/99

1. The finality of the 8/10/98 Office action is withdrawn. The amendment filed 1/11/99 has been entered.

2. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 24, 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over any of Japan 61256282, Japan 0220686 or Japan 0031090, in view of Sofer.

The primary references each show operating a nuclear reactor wherein the fuel assemblies have at least one water rod, in a manner such that the water rod has a steam void therein during a first part of the fuel cycle, and, is completely filled with water during a second part of the fuel cycle by increasing the coolant flow rate. While the primary references may

accomplish this change in flow by changing the size of an opening in the water rod, it was also a known alternative in this art that this necessary change in flow rate could also be accomplished by changing the flow rate at which the coolant is recirculated in the reactor system (as shown for example by Sofer) and, to so modify any of the primary references would accordingly have been prima facie obvious.

Note this respect that Sofer also indicates it is advantageous to reduce the void fraction towards the end of the fuel cycle (the same as in any of the primary references).

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Even more particularly, applicant has not shown that the manner and reasoning with which the examiner combined the teachings of the references, is improper or in error.

Most importantly, applicants are incorrect in stating that a "fuel cycle is an operating period of a nuclear reactor from starting of the reactor to shutdown of the nuclear reactor".

Applicants are also incorrect in stating that this statement regarding a fuel cycle, is described in their specification at page 15 line 34 to page 16 line 3.

Instead, said portion of the specification actually states that one fuel cycle, is the operation period of a nuclear reactor from when the fuel in the reactor core is replaced and operation of the reactor is started to when the nuclear reactor is stopped for renewing of the fuel.

Said page 15 line 33 to page 16 line 3 has been reproduced below for applicants convenience.

"This operation method applies for one fuel cycle (operation period of a nuclear reactor from when the fuel in the reactor core is replaced and operation of the nuclear reactor is started to when the nuclear reactor is stopped for renewing the fuel, i.e., usually , one year)". (underling added).

Clearly, a nuclear reactor can be shutdown for reasons other than for refueling.

For example, the shutdown of a nuclear reactor due to reactor scram, is not referred to as a "fuel cycle".

Note particularly that the English language translation of Shugotai clearly indicates that the amount of voids in the water rod is changed from a first half stage to a second half stage of the fuel combustion (i.e. during one fuel cycle) and, that the fuel assembly containing said water rod is not removed or extracted from the reactor core nor is it shuffled.

This same feature of changing the amount of voids in a water rod during a fuel cycle, is also referred to in either of the other two primary references.

For example, the English language translation of Japan 0031090 refers to changing the amount of voids in the water rod without removing the fuel assembly from the core and, that this changing of the amount of voids takes place after a first period of operation with a high amount

of voids in the water rod (the water rod being filled with water (zero voids) during the subsequent period of operation.

This same teaching is also found in the other primary reference of Japan 0220686.

Note that each of the primary references indicates that this changing of the amount of voids in the water rod during a fuel cycle advantageously allows one to take advantage of the spectral shift effect.

Note further, that the secondary reference of Sofer also teaches that changing the amount of voids in the reactor core during a fuel cycle allows one to take advantage of the spectral shift effect.

While the primary references show that the changing of the amount of voids during a fuel cycle, can be accomplished by changing the size of the inlet orifice to a water rod (and thus leaving the pump recirculation flow rate the same), the secondary reference of Sofer teaches that this changing of the amount of voids during a fuel cycle can be accomplished by appropriately increasing the recirculation rate of the pumps (e.g. see col. 2 lines 23-32).

Note that Sofer teaches that this manner of changing the amount of voids is especially simple and economical (col. 2 lines 16-20).

Accordingly, it is maintained that it would have been prima facie obvious to have modified any of the primary references by producing the desired change in the amount of voids in the water rod during a fuel cycle, by the "especially simple and economical" manner of changing the coolant flow reactor of the circulation pumps (as an alternative to the obviously

more costly and laboriously manner of changing the amount of voids by changing the size of an orifice in the water rods).

As pointed out above, the primary references each teach that the changing of the amount of voids should take place during the fuel cycle. Clearly, if the fuel assembly containing said water rod was removed, thus signaling the end of the fuel cycle, the plutonium produced in the fuel assembly (during the first period of operation with a large amount of voids) would not be burned up in the latter part of the fuel cycle when there are less voids present (the reactor would thus not be taking advantage of the spectral shift effect).

However, even if the primary references did not teach that one should change the amount of voids in the water rod during a fuel cycle (so as to take advantage of the spectral shift effect), it would have been obvious in any event to have modified any of the primary references by changing the amount of voids during the fuel cycle, in view of the express teachings in Sofer that it is advantageous to change the amount of voids during the fuel cycle by changing the recirculation coolant flow rate, so as to be able to take advantage of the spectral shift effect in an especially simple and economical manner (e.g. in Sofer see the Abstract, col. 2, lines 10-32, col. 5, lines 48+, col. 6).

As pointed out by applicant in the 1/11/99 response, changing the flow rate of a pump inherently and obviously involves changing the number of revolutions of the pump.

It is further noted that the issue is not what was known by the artisan or would have been obvious to the artisan, at the time of filing of the Sofer patent, but rather, what would have been

obvious to the artisan as of the time of filing of the present case (at which time it was conventional for boiling water reactors to utilize fuel assemblies containing water rods).

4. Claims 24, 26, 29, 40-43, 50, 52-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Patterson et al in view of Sofer taken with any of Japan 0220686, Japan 0031090 or Japan 61256282.

Patterson et al (note Fig. 1) show a fuel assembly having a plurality of fuel rods 10 held between upper tie plate 12 and lower tie plate 6, a plurality of fuel spacers 16 and, at least one water rod 18.

Patterson et al, in Fig. 4 show the water rod 18 having a coolant ascending path and a coolant descending path.

Said Fig. 4 of Patterson et al show the coolant ascending path as having a coolant inlet port open in a region below the lower fuel rod supporting tie plate 6 (the claimed resistance member) and, the coolant descending path as having a coolant delivery port 30 arranged in a position higher than the lower fuel rod supporting tie plate 6.

The claims refer to a manner of operating a boiling water reactor wherein the water rod has a steam void therein during a first part of the fuel cycle and, is completely filled with water during a second part of the fuel cycle by increasing the coolant flow rate. Such, however, is already shown to be old and advantageous in the art by any of Japan 61256282, Japan 0220686 or Japan 0031090 and, to so modify Patterson et al would accordingly have been prima facie obvious. While any of the Japanese references accomplish the desired change in flow by

changing the size of an opening in the water rod, it was also a known alternative in this art that this necessary change in flow rate could also be accomplished by changing the flow rate at which the coolant is recirculated in the reactor system (as shown for example by Sofer) and, to so modify any of the primary references would accordingly have been prima facie obvious.

Note in this respect that Sofer also indicates it is advantageous to reduce the void fraction towards the end of the fuel cycle (the same as in any of the Japanese references).

Note that claims such as claim 53 merely set forth conventionally known and utilized flow rate percentages, the use of which would accordingly have been prima facie obvious.

Applicants arguments are unpersuasive.

Applicant is incorrect in arguing that the Patterson et al system could not operate if there was a coolant/vapor surface in the water rod.

The presence of vapor in the water rod merely means that the critical power level is not as high (e.g. see col. 1 lines 60-66 of Patterson et al).

Furthermore, it is considered clear and obvious on its face that there will be an "offset" to operating Patterson et al only during a first period of the fuel cycle, with a coolant/vapor surface or interface in the water rod, this offset being the economic benefit of producing extra fissile material (plutonium) in the fuel assembly during the first period of the fuel cycle wherein the water rod contains vapor (has a coolant/vapor surface or interface) with this produced fissile plutonium being subsequently burned in a latter part of the fuel cycle when the water rod is

filled with water coolant (thus producing a softer neutron spectrum and allowing one to take advantage of the "spectral shift effect").

Sofer (as well as any of the Japanese references) provide the express teaching that it is advantageous in the boiling water reactor art (to which the primary reference of Patterson et al is directed) to operate the reactor such that there is a greater amount of voids present during a first period of the fuel cycle so as to enhance the production of fissile plutonium, with this produced plutonium being burned in a latter part of the fuel cycle wherein the reactor is operated with a decreased amount of voids (which produces a softer neutron spectrum).

5. Claims 24, 26, 29, 40-43, 50, 52-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matzner in view of Sofer and any of Japan 0220686, Japan 0031090 or japan 61256282.

Matzner shows a fuel assembly having a plurality of fuel rods R (which inherently contain fuel pellets) held between upper and lower tie plates (U, L), spacers and at least one water rod W (e.g. see Fig. 1 and col. 1, 2, 3).

The water rod W has a coolant inlet 14 open in a region below the lower tie plate L. Water rod W has a coolant ascending path inside conduit 14 (which become standpipe 15) and, a coolant descending path in the annulus between pipes 15 and 18 with coolant delivery ports 20. The lower tie plate of Matzner will function as a "resistance member".

The claims refer to controlling amounts of voids in the water rods. As indicated even by applicants own specification, the formation of voids in the water rods is dependent on the

amount or rate of coolant flow produced by the circulation pump. Matzner refers to flowing coolant though the core by means of "conventional circulating pumps" (col. 3, lines 64+). Such pumps are inherently capable of operation at different flow rates. Thus, the use of a circulation pump which can operate at different flow rates and consequently produce different amounts of voids in the water rods is considered inherent in the teachings of Matzner.

The claims refer to this manner of controlling the amounts of voids in the water rods as operating the water rods with steam voids therein during a first part of the fuel cycle and, operating such that the water rods are completely filled with water during a second part of the fuel cycle. Such however, is already, shown to be old and advantageous in the art by any of Japan 0220686, Japan 61256282 or Japan 0031090 and to so modify Matzner would accordingly have been prima facie obvious. While the Japanese references each accomplish the desired change in flow by changing the size of an opening in the water rod, it was also a known alternative in this art that this necessary change in flow rate could also be accomplished by changing the flow rate at which the coolant is recirculated in the reactor system (as shown for example by Sofer) and, to so modify the primary reference would accordingly have been prima facie obvious.

Note in this respect that Sofer also indicates it is advantageous to reduce the void fraction towards the end of the fuel cycle (the same as in each of the Japanese reference).

Note that claims such as claim 53 merely set forth conventionally known and utilized flow rate percentages, the use of which would accordingly have been prima facie obvious.

Applicants arguments are unpersuasive.

Applicants arguments concerning hindsight reconstruction, have been adequately discussed above.

Applicant has not shown that the manner and reasoning with which the examiner combined the teachings of the references, is improper or in error.

Note that Sofer (or well as any of the Japanese references) provide the express teaching that it is advantageous in the boiling water reactor art (to which the primary reference of Matzner et al is directed) to operate the reactor such that there is a greater amount of voids present during a first period of the fuel cycle so as to enhance the production of fissile plutonium, with this produced plutonium being burned in a latter part of the fuel cycle wherein the reactor is operated with a decreased amount of voids (which produces a softer neutron spectrum).

6. Claims 24, 26, 29, 40-43, 50, 52-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Patterson et al in view of Sofer taken with any of Japan 0220686, Japan 0031090 or Japan 61256282 as applied to claims 24, 26, 29, 40-43, 50, 52-57 above, and further in view of applicants own admission of prior art in the specification (e.g. see page 25).

The use of the claimed flow rate percentages (e.g. see claim 53), in the primary reference would have been prima facie obvious in view of the teachings thereof in the admitted prior art in the specification.

7. Claims 24, 26, 29, 40-43, 50, 52-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matzner in view of Sofer and any of Japan 0220686, Japan 0031090 or Japan 61256282 as applied to claims 24, 26, 29, 40-43, 50, 52-57 above, and further in view of applicants own admission of prior art in the specification (e.g. see page 25).

Claims such as claim 53, refer to use of particular flow rate percentages. However, the use of the claimed flow rate percentages in the primary reference would have been prima facie obvious in view of the teachings thereof in the admitted prior art in the specification.

8. Claims 24, 26, 29, 40-43, 50, 52-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over any of Japan 61256282, Japan 0220686 or Japan 0031090, in view of Sofer as applied to claims 24, 50 above, and further in view of any of Matzner, Patterson et al or Kumpf.

Claims such as claim 26 refer to the water rod as having a coolant ascending path with a coolant inlet port open in a region lower than the lower tie plate and a coolant descending path which has a coolant delivery port that is open in a region higher than the lower tie plate (the claimed resistance member.

However, such is a conventionally known and advantageous water rod configuration as shown by any of Matzner, Patterson et al or Kumpf and, to utilize this water rod configuration in any of the primary references would accordingly have been prima facie obvious.

Applicants arguments are unpersuasive as applicant has not shown that the manner and reasoning with which the examiner combined the teachings of the references is improper or in error.

9. PTO translations of Japan 0031090 and Japan 0220686 are enclosed (such representing the official translations).

ASA N1.1-1957 sets forth the definition of the terms "shutdown" and "scram".

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

11. Any inquiry concerning this communication should be directed to Mr. Behrend at telephone number (703) 305-1831.

Behrend/oc
August 13, 1999
August 19, 1999

HARVEY E. BEHREND
PRIMARY EXAMINER